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DSSD CENSUS 2000 PROCEDURES AND OPERATIONS MEMORANDUM SERIES B-4

MEMORANDUM FOR Howard Hogan
Chief, Decennial Statistical Studies Division

From: J. Gregory Robinson JGR
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Subject: Accuracy and Coverage Evaluation Survey: Demographic Analysis Results (Prototype)

The attached document is a prototype of the report that we will prepare, per your request, following completion of applicable Accuracy and Coverage Evaluation Survey (A.C.E.) operations. The completed report is intended to aid the Executive Steering Committee on A.C.E. Policy (ESCAP) in its recommendation regarding the release of the statistically corrected data or the data without statistical correction as the P.L. 94-171 data. This report, together with other reports, will assess the operations and results of both the initial Census and the A.C.E. Both sets of assessments will be available to the ESCAP to aid the Committee in reaching its recommendation regarding the use of the statistically corrected data.

This report focuses on the consistency of the A.C.E. results with findings based on Demographic Analysis (DA). DA is a separate and independent coverage evaluation program conducted at the Census Bureau.

It is important to note that the conduct of the operations may lead us to modify the attached format by including additional information. It is also likely that descriptions and definitions will be enhanced or the data items could undergo revision. Conversely, we may conclude, for a variety of reasons, that some of the information set forth in the attached prototype may not be available. The attached document sets forth our conclusions prior to completion of the A.C.E. about what information would properly inform the ESCAP on this subject, but is subject to modification.

Accuracy and Coverage Evaluation 2000: Demographic Analysis Results (Prototype)

Prepared by J. Gregory Robinson

Introduction

Demographic Analysis (DA) is well developed as a tool for coverage evaluation. DA is an analytic approach which has been extensively used at the Census Bureau to measure coverage of the national population in every census since 1960 (see Siegel and Zelnik, 1966; U.S. Bureau of the Census, 1974, 1988; and Robinson et al, 1993a for the basic demographic evaluations of the 1960 - 1990 censuses).

Demographic Analysis represents a macro-level approach, where analytic estimates of net undercount are derived by comparing aggregate sets of data or counts. The demographic approach differs fundamentally from the survey-based Accuracy and Coverage Evaluation (A.C.E.). The traditional DA population benchmarks are developed for the census date by analysis of various types of demographic data essentially independent of the census, such as administrative statistics on births, deaths, immigration, and Medicare enrollments, as well as estimates of emigration and undocumented immigration. The difference between the DA benchmarks and the census count provides an estimate of the census net undercount. Dividing the net undercount by the DA benchmark provides an estimate of the net undercount rate.

Internal consistency is an important aspect of the independence of DA. The foundation of the demographic method is the logical and longitudinal consistency of the underlying demographic data. DA follows the process of population change as it occurs, starting with births, then incrementing or decrementing cohort size with subsequent information on mortality and net migration. The administrative data for DA are virtually complete (no samples involved) and available annually for the core components of births, deaths, immigration, and Medicare enrollments.

Demographic Analysis estimates serve two principal purposes in census evaluation:

1) DA estimates provide an independent benchmark to assess completeness of coverage in the current census and document changes in coverage from previous censuses. The national DA estimates have become the accepted benchmark for tracking historical trends in net census undercounts and for assessing coverage differences by age, sex, and race (Black, all other). As in past censuses, DA estimates will provide a new independent assessment of coverage in Census 2000 to add to the historical time series. (See Robinson et al, 2000, for a discussion of the DA program for 2000).

2) The independence and internal consistency of the DA estimation process allows us to check the survey-based A.C.E. coverage estimates; in particular, to assess the consistency of the age-sex results. As noted above, DA and A.C.E. use entirely different methodologies.

The sources and patterns of errors in the two estimates are sufficiently different that agreement or disagreement in the results will be important to understand.

This prototype report focuses on this second use of DA, that is, to assess the consistency of the DA and A.C.E. coverage results.

Overall Assessment

In the final report, this section will summarize the assessment of consistency of the A.C.E. and Demographic Analysis coverage results.

Background

The Demographic Analysis coverage benchmarks provide a useful, but limited assessment of the accuracy of the A.C.E. results given the limitations of DA estimates and some differences in the two approaches to coverage measurement. These are discussed below.

A. Limited detail of DA estimates

The major DA estimates are available only at the national level and only for two broad race categories (Black and All other Races Combined–referred to as "Nonblack" in this report). So independent DA benchmarks are not available for the specific A.C.E. poststrata cells; we will compare the DA results to the A.C.E. results after aggregation across poststrata. As will be noted, DA benchmarks for more detailed race/ethnic groups (e.g., Hispanics, Asians, and White non-Hispanics) can be developed to broadly assess the consistency of the census, A.C.E., and demographic estimates. Also, DA benchmarks for subnational areas have been developed (see Robinson, 1996, and Robinson et al, 1999, for application of new subnational DA benchmarks for coverage evaluation), and early demographic benchmarks that assess housing coverage have been prepared for the first time (West and Robinson, 1999).

B. Uncertainty in DA estimates

A concern regarding DA estimates is the uncertainty of the measured undercounts. The aggregate administrative data and estimates used to construct the DA benchmarks are corrected for various types of errors. Many assumptions go into this estimation process, some of which can be validated and some of which are based on quite limited information.

Births are by far the largest component of population change involved in the DA system; thus, even relatively small errors in the estimates of births and the assumptions used to correct for underregistration of births can have significant effects. The potential error would be greatest for the cohorts born before about 1950, where adjustments for birth underregistration are the largest. DA estimates for race groups are also affected by the consistency of the classification of births by race with race classifications in the census. Race at birth is assigned on the basis of the race of the

parents, and different algorithms can lead to different race assignments for births to mixed-race couples. While not affecting DA totals, this uncertainty affects DA race estimates principally for the cohorts born after 1980. (See Robinson, 1991, for a discussion of errors in the births estimates and Robinson and Lapham, 1991, for a discussion of the inconsistency in race classifications).

Immigration and emigration, while smaller overall components than births, are subject to more relative error because of the greater uncertainty of some specific estimated elements (especially emigration and undocumented immigration). (See Woodrow, 1991a and 1991b, for discussions of sources of error in these components.)

For the first time, the national DA estimates in 1990 were accompanied by quantifiable measures of error (Das Gupta, 1991). This research demonstrates that DA estimates are subject to less error in terms of measuring differences in coverage according to age, sex, and race than absolute coverage levels. Many of the errors in the estimates are consistent and hence tend to "cancel" in comparisons across sex, race, and time. For example, the DA sex ratios (ratio of males to females) are less error-prone than the DA undercount estimates themselves (see Robinson et al., 1993a).

In sum, the internal consistency of the demographic estimates permits trends and changes in coverage patterns over time to be estimated more accurately than the exact level of net coverage in any given census. This greater confidence in statements describing differences in undercount across time or between groups is important to make, because DA-measured differentials are the main tool used in the assessment of the consistency of the A.C.E. results.

We will include measures of error around the DA estimates of net undercount and sex ratios in Census 2000 when making comparisons to the A.C.E. results.

C. Inconsistencies in race classifications

The race categories in the DA estimates reflect largely the race assigned in the particular administrative record at the time of the event (birth, death, enrollment in Medicare). The DA estimates of net undercount will be biased if persons who are classified as a particular race in DA (e.g., Black) are reported as some other race in the census.

The effect of the new "mark one or more" census race question for 2000 will complicate the traditional comparison of DA estimates by race with census race tabulations. In fact, the Census 2000 tabulations will not include a category "Black" that is comparable to 1990 or earlier census tabulations. Tabulations for 2000 will contain several classifications that include Black respondents, including tabulations of the number of persons who marked only the Black circle and tabulations of persons who marked "Black" and multiple response options to the race question.

To deal with the multiple race option, we will present alternative DA estimates whenever "race" is

one of the variables in the net undercount estimate. In the prototype tables, we present DA net undercount rates based on two models: (1) Model 1 compares the 2000 DA estimates for Blacks with Census 2000 tabulations for persons who marked only the race circle for "Black", (2) Model 2 compares the 2000 DA estimates for Blacks with Census 2000 tabulations for persons who marked the race circle for "Black" and other race response circles (1 or more other circles). Model 1 will lead to a lower census number of Blacks.

A final inconsistency affects race comparisons of the DA and A.C.E. estimates. In 1990, the 9.8 million persons who reported their race as "Other Race-Not Specified" in the census were redistributed (for DA estimation) to the categories White, Black, American Indian, Eskimo, or Aleut, and Asian-Pacific Islander so that the census counts are consistent with the race categories of the historical demographic estimates. This "modification" to make the census race categories more comparable with the historical demographic data may again be done in 2000 for the DA estimation.

The inconsistencies in the race data place even more importance on the use of sex ratios for making inferences about coverage by race categories in Census 2000. Specifically, to the extent that the inconsistencies in reporting and the numbers marking more than one race are about the same for males and females, the inconsistencies will tend to cancel out in the calculation of sex ratios. We will test this assumption for the reporting of multiple races: are the sex ratios for persons who mark Black alone much different than the sex ratios for persons who mark Black and other races?

D. DA and A.C.E. universe differences

An important distinction between DA and the A.C.E. estimates is that DA refers to the total population while the A.C.E. covers the household population. The difference in the universes is the Group Quarters (GQ) population. The GQ population is included in the DA estimates, but it cannot be separated. The GQ population is excluded from the A.C.E. universe.

The A.C.E. approach essentially assumes that coverage of GQ's in the census is the best we can achieve. Differential coverage of the household and GQ population could affect the comparisons with the DA estimates, especially for population subgroups where the GQ population is relatively large.

We will assess the impact of GQ population coverage in two ways. First, the GQ population's share of the total population of each of the A.C.E. age-sex-race groups can be determined from 1990 census data. This will point to the subgroups that may be affected by the presence of differential coverage of GQ's (if it exists) and will identify other groups where the GQ population is so small that it has little effect on the estimates. Second, rough benchmarks of the GQ population by type (e.g., correctional institutions, nursing homes, military quarters, college dormitories) will be compared to Census 2000 results to broadly assess coverage completeness of GQ's.

Another difference in the DA and A.C.E. universe is that remote Alaska is excluded from the A.C.E. universe.

Comparison of Demographic Analysis and A.C.E. Results

The assessment is divided into two sections, and examples of tables that will "drive" the assessment are shown.

1. Comparison of 2000 A.C.E. Coverage Patterns with DA and Historical Trends

The main demographic analysis results of coverage at the national level are compared to corresponding A.C.E. coverage results.

1a. Comparison of Results for the Total Population, and Patterns by Sex, Race, and Age

Table and Figure 1–Estimates of Percent Net Undercount for the Total Population and by Sex
Table and Figure 2–Estimates of Percent Net Undercount by Race and Sex

The DA coverage benchmarks for Census 2000 reported in Tables 1 and 2 will set the stage for the overall evaluation of the DA and A.C.E. results. First, it will tell us about the magnitude of net undercount in Census 2000 as measured by DA and identify any changes in demographic patterns that occurred since 1990. Was the net undercount lower in 2000 than 1990 (Table 1)? Was the growing male-female gap (Table 1) or the persistent Black-Nonblack differential (Table 2) reduced?

Second, we will compare the A.C.E. results for 2000 with the above DA benchmarks to assess if they show similar coverage patterns. Do the DA and A.C.E. measure the same magnitude of net undercoverage in 2000 (Table 1)? Do they agree in the detection of changes (or lack of changes) in net undercount patterns since 1990 (Table 1 for sex comparisons, Table 2 for race and sex comparisons)?

Table and Figure 3–Estimates of Percent Net Undercount by Sex and Age
Table and Figure 4–Estimates of Percent Net Undercount by Race, Sex and Age

The information in Tables 3 and 4 add the important dimension of age. Do the 2000 DA benchmarks show the same distinct age profile for sex and race groups observed in earlier censuses (with the highest net undercount rates for adult males- - especially for adult Black males–and the lowest rates for adult females) or have the undercount rates by age converged? (See Table 3 for sex-age comparisons, and Table 4 for race-sex-age comparisons).

Do the A.C.E. results show the similar age profile of net coverage as measured by DA, and do they document the same age patterns of change since 1990?

For a prototype of specific DA-survey based comparisons, Appendix Table 1 compares detailed net undercount estimates from the 1990 PES to the corresponding 1990 DA estimates. A similarly detailed table will be produced for comparing the 2000 A.C.E. and DA estimates; one difference will be that more than one set of estimates will be compared for race groups.

1b. Comparison of Sex Ratio Results

Table and Figure 5–Sex Ratios for Blacks and Nonblacks, by Age
Table and Figure 6–Historical Sex Ratios for Black and Nonblack Adults (18+)

Table 5 presents comparisons of sex ratios in 1990 for the census, Post Enumeration Survey (PES), and Demographic Analysis. The same comparison will be made with 2000 results of the census, A.C.E. and DA. Given the additional uncertainty that the new multiple race category may add to the DA estimates, the sex ratio analysis will be particularly important in interpreting differences between the DA and A.C.E. results for race categories.

Will the 2000 DA sex ratios show the same distinctly different profiles for race groups observed in 1990, with the census sex ratios for Blacks falling substantially below the expected ratios for the adult ages (implying higher net undercount rates for Black males than Black females) and the sex ratios for Nonblacks showing only a "small" gap? Or will the gap for Blacks narrow, suggesting a reduction in the differential undercount of Black men. These findings should be consistent with the results indicated by the direct net undercount estimates of Table 4.

Second, do the A.C.E. results for 2000 show a profile of sex ratios similar to that measured by DA for 2000, or are the A.C.E. sex ratios more like the census sex ratios as in 1990? The "low" PES ratios for Blacks in 1990 implied that the PES understated the net undercount of adult Black men (the well-known "correlation bias"). As shown by the historical sex ratio comparisons in Table 6, signs of correlation bias (relative to DA) are consistently found in the results of previous coverage measurement surveys. The correspondence of the DA and A.C.E. sex ratios will be a particularly useful assessment tool. This analysis will supplement the study of correlation bias outlined in the document by William Bell (2000).

2. Other Demographic Coverage Benchmarks

Crude demographic benchmarks for Hispanics and other race/ethnic groups and demographic coverage indicators for subnational areas are compared to the Census 2000 and A.C.E. results to provide additional consistency checks.

As part of the Census Bureau's ongoing population estimates program, the 1990 census population for race groups (White; Black; American Indian, Eskimo, or Aleut; Asian and Pacific Islander) and for Hispanics are carried forward ("projected") each year based on estimates of components of change since 1990. Estimates of the April 1, 2000 population are available. The published estimates are "census-level". Differences from the Census 2000 counts provide an

"error of closure," which measures the net effect of differences in net undercount in 1990 and 2000 and errors in the measurement of true population change (1990 to 2000) for the detailed demographic groups. Modified error of closure measures can be developed by adjusting for 1990 undercount using the PES, "reducing" the differences to that of 2000 undercount and errors in the components of change. Although very crude, these error of closure measures, when supplemented by the DA results, provide a way to assess the overall consistency of the census, A.C.E. and demographic estimates. Major deviations could signal a major error in one of the systems, which would be investigated. (See Robinson et al, 1993b, for an example of the error of closure analysis of the 1990 census results).

During the 1990's, we developed a set of illustrative coverage indicators for subnational areas and used these to broadly evaluate coverage in the 1995 Test Census and 1998 Dress Rehearsal (Robinson, 1996; Robinson et al, 1999). The indicators include independent benchmarks of the total population, independent housing unit benchmarks, benchmarks for young children (under age 10) based largely on birth statistics, school enrollment data (to assess the population ages 7-14), and Medicare data (to assess the population 65 and over). We examine the overall consistency of these benchmarks with the census results. If inconsistences are found (e.g., an indicator suggests a decline in coverage from the previous census), are the inconsistencies observed for each of the different benchmarks derived from different data sources? This is essentially another error of closure analysis that can provide a crude assessment of the overall agreement of the census, demographic benchmarks, and A.C.E. results.

As an example, coverage indicators for young children (under age 10) have been developed for the 1970-1990 censuses that provide pertinent information to document coverage differences for regions (see Figure 7a-7c); these crude benchmarks will provide a systematic basis to assess changes in regional patterns of coverage in Census 2000 (albeit for a limited population subgroup). In 1970-1990, the net undercount of Black children was uniformly high in all regions of the country; for Nonblack children, the overall lower net undercount rates show a distinct regional pattern, with the rates being consistently higher in the South and West than in the Northeast and Midwest. Do these longstanding patterns change in 2000? Also, as illustrated in Figure 7a, the regional patterns of the DA rates in 1990 broadly correspond to the patterns measured by the 1990 PES, providing an independent validity check. We will make similar consistency checks with the A.C.E. results.

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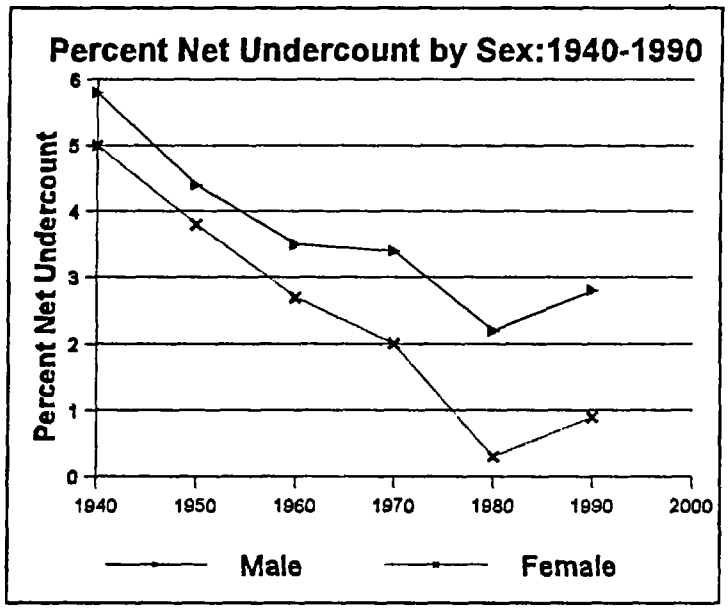
Table 1--Estimates of Percent Net Undercount by Sex: 1940 to 2000

Category	Demographic Analysis							A.C.E.
	1940	1950	1960	1970	1980	1990	2000	2000 [1]
Total Population	5.4	4.1	3.1	2.7	1.2	1.8		
Male	5.8	4.4	3.5	3.4	2.2	2.8		
Female	5.0	3.8	2.7	2.0	0.3	0.9		
Male:Female Diff.	0.8	0.6	0.8	1.4	1.9	1.9		

Source: Robinson, J. Gregory, Bashir Ahmed, Prithwis Das Gupta, and Karen Woodrow, "Estimates of Population Coverage in the 1990 United States Census Based on Demographic Analysis", Journal of the American Statistical Association, Vol. 88, No. 423, pp. 1061-1077.

Figure 1



[1]A.C.E. net undercount estimates are prior to the controlled rounding process.

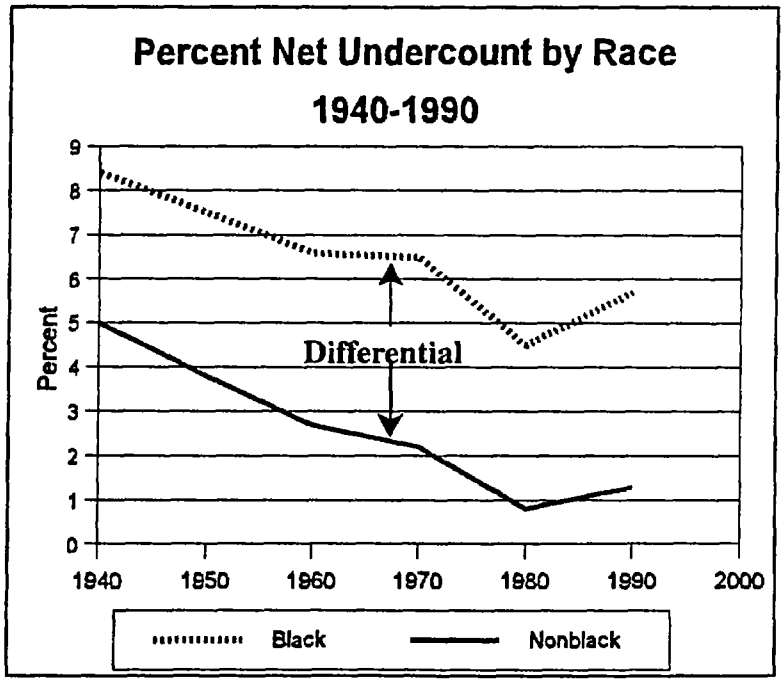
Table 2--Estimates of Percent Net Undercount by Race and Sex: 1940 to 2000

Category	Demographic Analysis								A.C.E. 2000[1]	
							2000			
	1940	1950	1960	1970	1980	1990	Model 1	Model 2	Model 1	Model 2
Total Population	5.4	4.1	3.1	2.7	1.2	1.8				
Black	8.4	7.5	6.6	6.5	4.5	5.7				
Male	10.9	9.7	8.8	9.1	7.5	8.5				
Female	6.0	5.4	4.4	4.0	1.7	3.0				
Nonblack	5.0	3.8	2.7	2.2	0.8	1.3				
Male	5.2	3.8	2.9	2.7	1.5	2.0				
Female	4.9	3.7	2.4	1.7	0.1	0.6				
Black:Nonblack Diff.	3.4	3.7	3.9	4.3	3.7	4.4				

Note: Model 1 uses census tabulations for Blacks that include persons who marked the Black circle and no other response circle to the race question. Model 2 uses census tabulations for Blacks that include persons who marked the Black circle and other race response circles.

Source: Robinson, J. Gregory, Bashir Ahmed, Prithwis Das Gupta, and Karen Woodrow, "Estimates of Population Coverage in the 1990 United States Census Based on Demographic Analysis", Journal of the American Statistical Association, Vol. 88, No. 423, pp. 1061-1077.

Figure 2



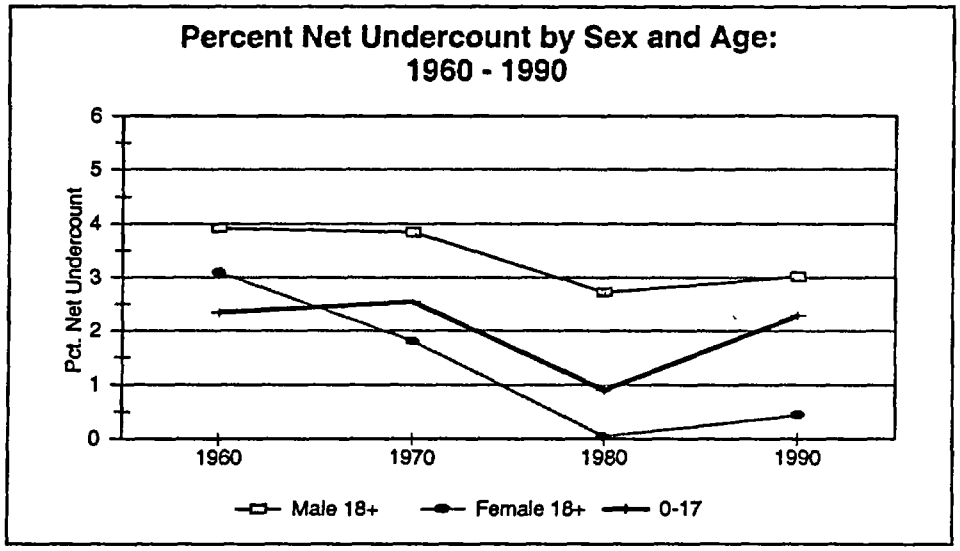
[1]A.C.E. net undercount estimates are prior to the controlled rounding process.

Table 3--Estimates of Percent Net Undercount by Sex and Age: 1960 to 2000

Category	Demographic Analysis					A.C.E[1]
	1960	1970	1980	1990	2000	2000
MALE						
Total	3.5	3.4	2.2	2.8		
0-17	2.8	2.7	0.9	2.2		
18-29	5.9	3.9	3.3	2.2		
30-49	4.2	5.1	3.6	3.8		
50+	2.2	2.5	1.2	2.7		
FEMALE						
Total	2.7	2.0	0.3	0.9		
0-17	1.8	2.4	0.9	2.4		
18-29	2.8	1.3	0.4	0.6		
30-49	1.9	1.3	0.0	0.5		
50+	4.6	2.6	-0.2	0.2		

Note: DA estimates are consistent with the estimates in Table 1.

Figure 3



[1]A.C.E. net undercount estimates are prior to the controlled rounding process.

Table 4--Estimates of Percent Net Undercount by Race, Sex and Age: 1960 to 2000

Category	Demographic Analysis						A.C.E 2000[1]	
					2000			
	1960	1970	1980	1990	Model 1	Model 2	Model 1	Model 2
BLACK MALE								
Total	8.8	9.1	7.5	8.5				
0-17	5.4	6.2	4.2	5.9				
18-29	15.1	12.1	9.2	7.7				
30-49	11.9	14.5	13.1	12.3				
50+	6.6	6.3	4.6	8.3				
BLACK FEMALE								
Total	4.4	4.0	1.7	3.0				
0-17	4.0	5.6	3.9	5.9				
18-29	5.4	4.5	2.4	2.9				
30-49	2.1	0.5	0.6	2.5				
50+	7.6	3.8	-1.9	-0.8				
NONBLACK MALE								
Total	2.9	2.7	1.5	2.0				
0-17	2.4	2.1	0.3	1.5				
18-29	4.6	2.8	2.4	1.3				
30-49	3.4	4.0	2.5	2.7				
50+	1.8	2.2	0.9	2.2				
NONBLACK FEMALE								
Total	2.4	1.7	0.1	0.6				
0-17	1.5	1.8	0.3	1.8				
18-29	2.4	0.9	0.1	0.3				
30-49	1.9	1.3	-0.1	0.2				
50+	4.3	2.5	0.0	0.3				

Note: Model 1 uses census tabulations for Blacks that include persons who marked the Black circle and no other response circle to the race question. Model 2 uses census tabulations for Blacks that include persons who marked the Black circle and other response circles. DA estimates are consistent with the estimates in Table 2.

Figure 4a

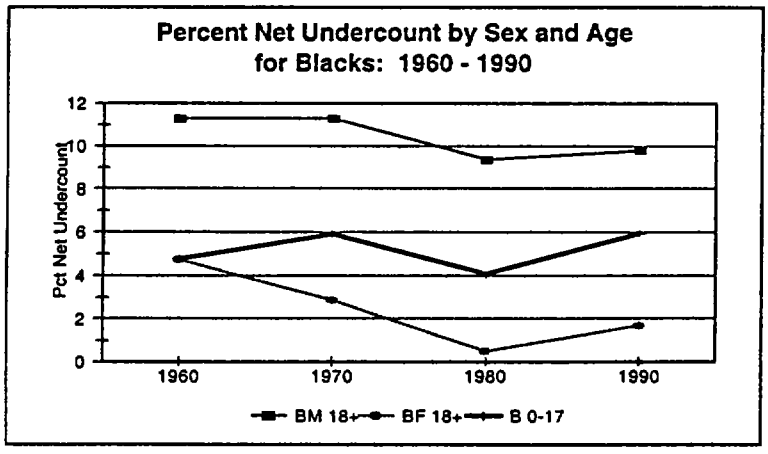
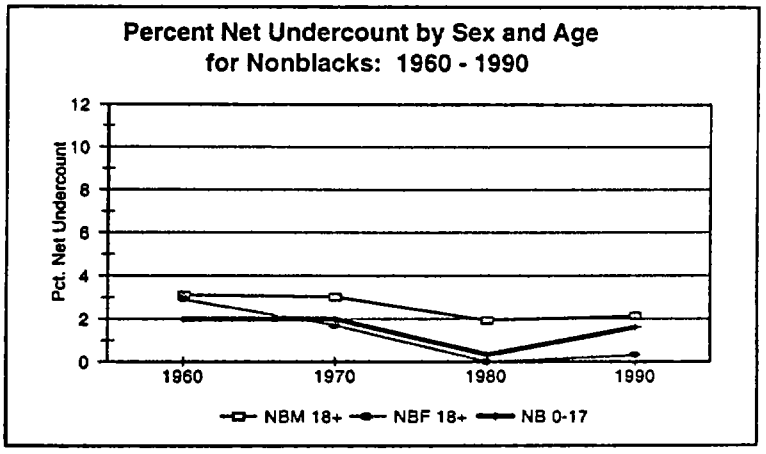


Figure 4b



[1]A.C.E. net undercount estimates are prior to the controlled rounding process.

Table 5--Sex Ratios for the Census, Coverage Measurement Survey, and DA, by Race: 1990 and 2000
(Sex ratios represent males per 100 females)

Category	1990			2000[1]				
				DA	A.C.E.		Census	
	DA	PES	Census		Model 1	Model 2	Model 1	Model 2
BLACK								
Total	95.2	90.4	89.6					
0-17	102.4	102.4	102.4					
18-29	99.3	92.1	94.0					
30-49	95.9	89.0	86.2					
50+	78.3	72.1	71.5					
NONBLACK								
Total	97.2	96.5	95.9					
0-17	105.2	105.5	105.5					
18-29	104.9	104.6	103.8					
30-49	102.0	100.3	99.6					
50+	80.8	79.9	79.4					

Note: Model 1 census tabulations for Blacks includes persons who marked the Black circle and no other response circle to the race question. Model 2 census tabulations for Blacks includes persons who marked the Black circle and other response circles.

Source: Appendix Table 1b.

Figure 5a

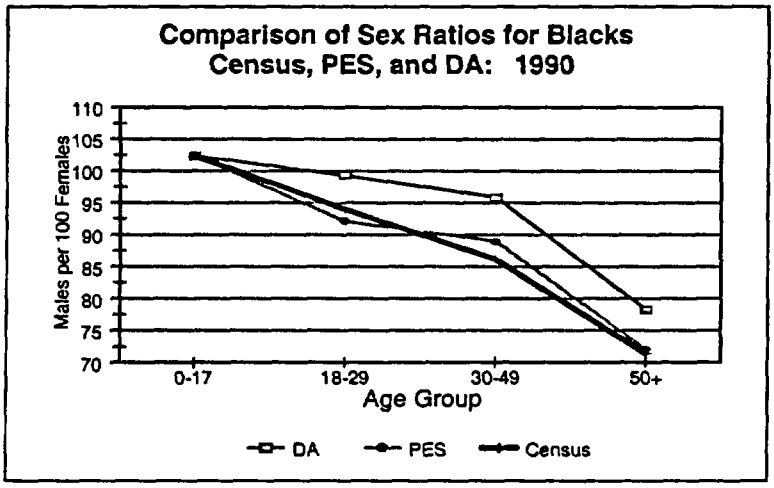
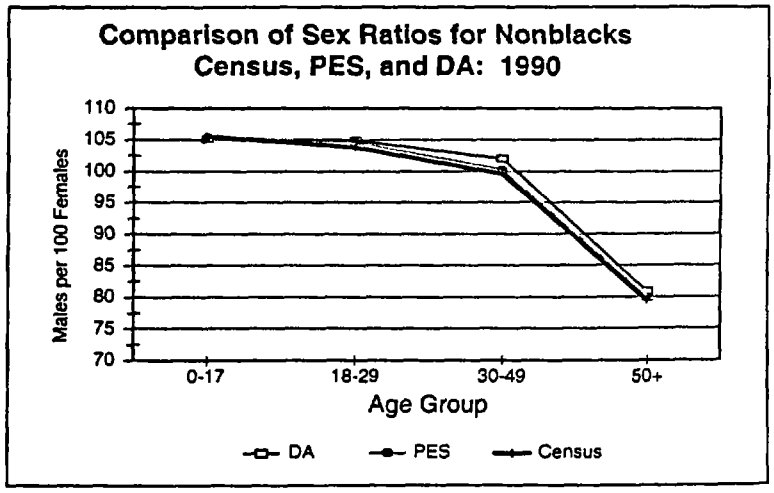


Figure 5b



[1]A.C.E. net undercount estimates are prior to the controlled rounding process.

Table 6–Sex Ratios for the Census, Coverage Measurement Survey, and DA, for Adults (Ages 18+) by Race: 1960 - 2000

(Sex ratios represent males per 100 females)

Category	1960	1970	1980	1990	2000 Model 1	2000 Model 2
BLACK						
DA	95.6	92.4	91.9	91.9		
Survey	89.6	84.6	85.5	85.3		
Census	89.0	84.4	83.7	84.3		
NONBLACK						
DA	94.5	92.4	93.5	94.7		
Survey	94.3	91.2	92.3	93.7		
Census	94.3	91.1	91.7	92.9		

Note: Model 1 census tabulations for Blacks includes persons who marked the Black circle and no other response circle to the race question. Model 2 census tabulations for Blacks includes persons who marked the Black circle and other response circles.
DA and Census sex ratios refer to the population 18+ in all years. Survey estimates are 18+ in 1990 (PES). For 1980 (PEP), coverage rates by sex for the population 20+ were assumed to represent coverage of the population 18+; for 1970 and 1960 the available survey undercount estimates for 15+ were used.

Sources: Census and DA data used to compute sex ratios are consistent with data used in Table 1 and 2. Survey data are from: PES for 1990; Post Enumeration Program for 1980; CPS-Census Match for 1970; and Reinterview study for 1960.

Figure 6a

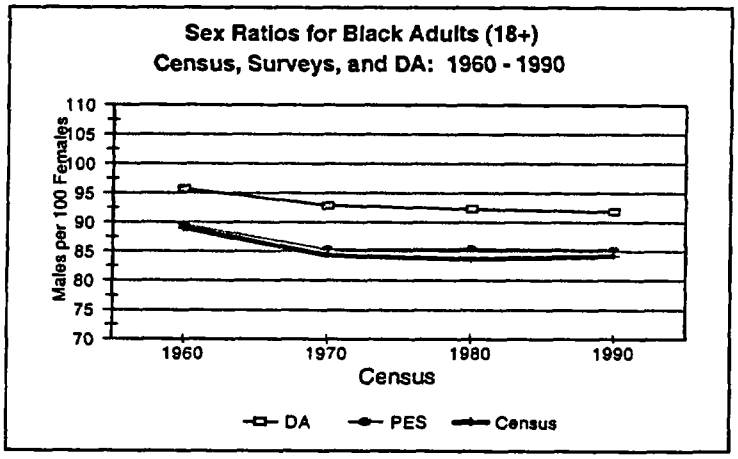
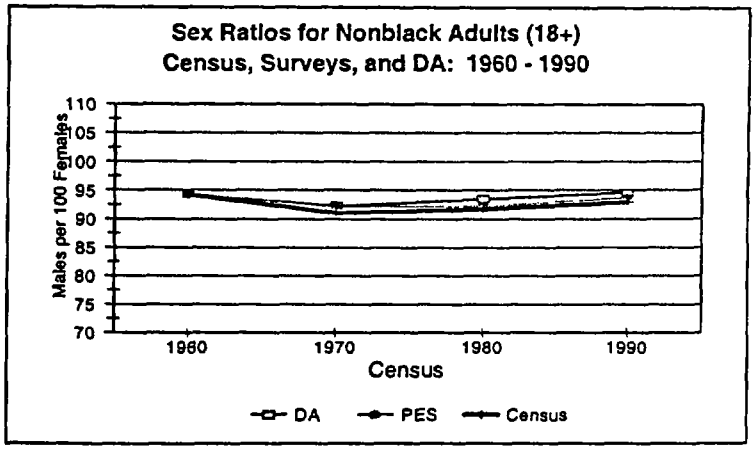


Figure 6b



Figures 7-- Examples of Subnational Demographic Benchmarks of Coverage

Figure 7a

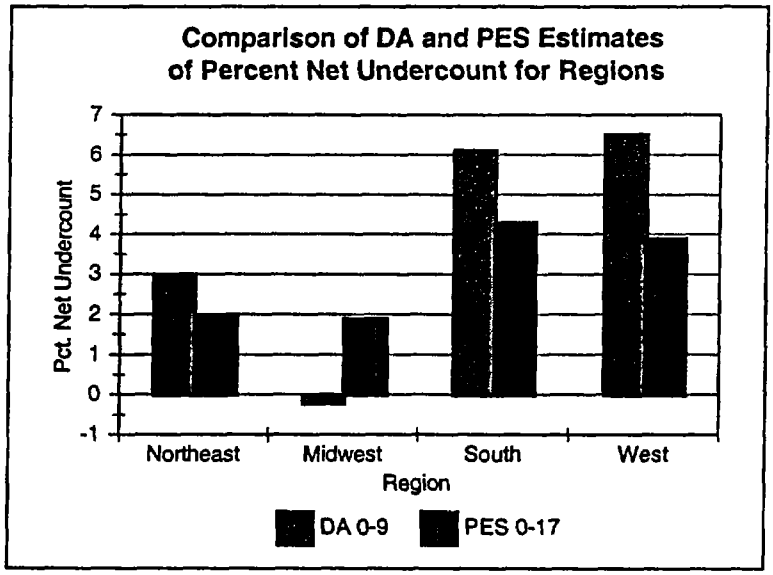


Figure 7b

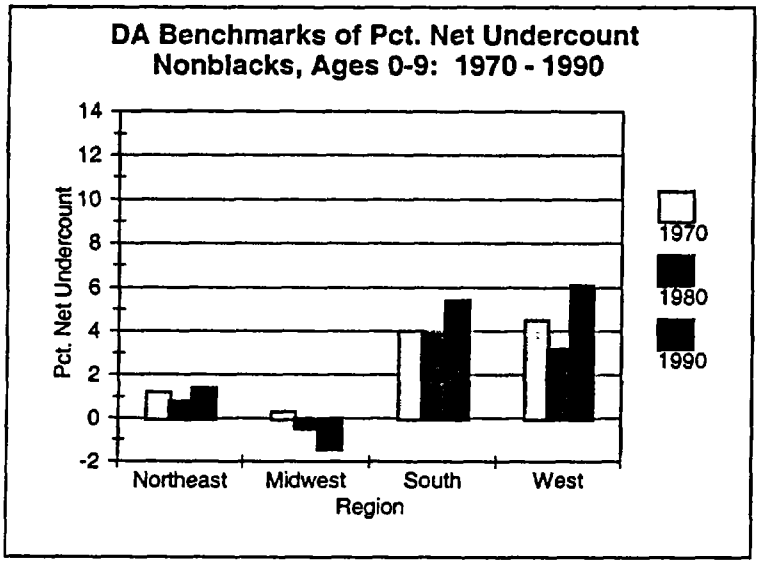
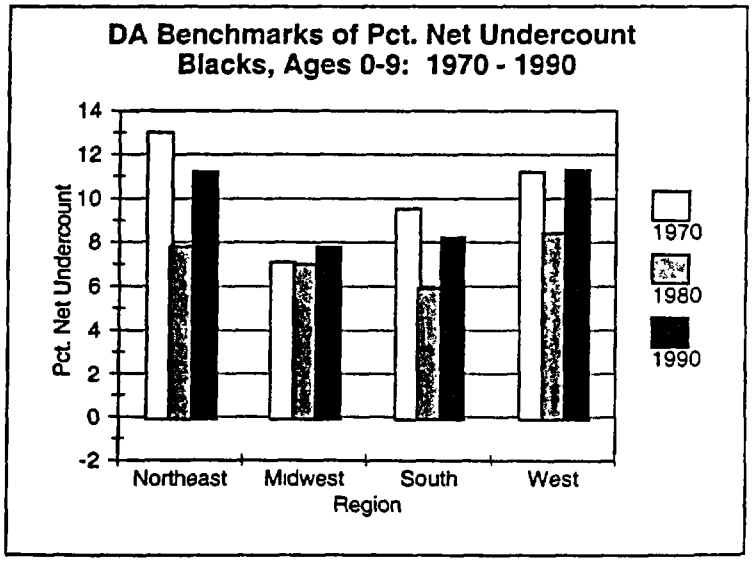


Figure 7c



Source: Robinson et al (2000).

Appendix Table 1a- Comparison of PES and DA Estimates of Percent Net Undercount, by Race, Sex, and Age: 1990

Race, Sex, Age	PES Estimated Population (1)	DA Estimated Population (2)	PES Net Undercount		DA Net Undercount		Difference between PES and DA Net Undercount		Sex Ratios (Males/ Females*100)			Sex Ratio Differences		
			Amount (3)	Percent (4)=3/1	Amount (5)	Percent (6)=5/2	Amounts (7)=5-3	Percents (8)=6-4	Census (9)	PES (10)	DA (11)	PES - Census 10-9	DA - Census 11-9	DA - PES 11-10
TOTAL	252,712,820	253,393,786	4,002,947	1.58	4,683,913	1.85	680,966	0.26	95.1	95.8	96.9	0.7	1.8	1.2
TOTAL MALE														
All ages	123,623,142	124,719,564	2,383,724	1.93	3,480,216	2.79	1,096,492	0.86	95.1	95.8	96.9	0.7	1.8	1.2
0-17	33,649,794	33,474,758	1,065,516	3.17	723,904	2.16	(341,612)	-1.00	105.0	105.0	104.8	-0.0	-0.3	-0.2
18-29	25,105,216	24,974,147	793,161	3.16	537,260	2.15	(255,901)	-1.01	102.4	102.8	104.1	0.4	1.7	1.3
30-49	36,965,692	37,549,070	683,935	1.85	1,438,442	3.83	754,507	1.98	98.0	98.9	101.2	1.0	3.3	2.3
50+	27,902,440	28,721,589	(158,888)	-0.57	780,610	2.72	939,498	3.29	78.6	79.1	80.6	0.5	1.9	1.4
TOTAL FEMALE														
All ages	129,089,678	128,674,222	1,619,223	1.25	1,203,697	0.94	(415,526)	-0.32						
0-17	32,045,587	31,950,086	1,025,433	3.20	777,223	2.43	(248,210)	-0.77						
18-29	24,424,918	23,986,940	686,162	2.81	153,492	0.64	(532,670)	-2.17						
30-49	37,361,657	37,086,454	329,051	0.88	185,881	0.50	(143,170)	-0.38						
50+	35,257,516	35,650,742	(421,423)	-1.20	87,101	0.24	508,524	1.44						
TOTAL BLACK	31,377,093	32,319,553	1,391,033	4.43	1,836,272	5.68	445,239	1.25	89.6	90.4	95.2	.0.8	5.6	4.7
TOTAL NONBLACK	221,335,727	221,074,233	2,611,914	1.18	2,847,641	1.29	235,727	0.11	95.9	96.5	97.2	0.7	1.3	0.6

Note: PES estimates are based on the "357-Poststrata" Design. The PES and DA methodology and results are found in Robinson et al (1993a) Col. 7-8. A positive difference means that the demographic estimate is higher than the PES estimate; a negative difference means that the demographic estimates is lower. Sex ratio differences are calculated with unrounded numbers.

Appendix Table 1b- Comparison of PES and DA Estimates of Percent Net Undercount, by Race, Sex, and Age: 1990

Race, Sex, Age	PES Estimated Population (1)	DA Estimated Population (2)	PES Net Undercount		DA Net Undercount		Difference Between PES and DA Net Undercount		Sex Ratios (Males/ Females*100)			Sex Ratio Differences		
			Amount (3)	Percent (4)=3/1	Amount (5)	Percent (6)=5/2	Amounts (7)=5-3	Percents (8)=6-4	Census (9)	PES (10)	DA (11)	PES - Census 10-9	DA - Census 11-9	DA - PES 11-10
BLACK MALE														
All Ages	14,900,868	15,758,711	730,717	4.90	1,338,380	8.49	607,663	3.59	89.6	90.4	95.2	0.8	5.6	4.7
0-17	5,215,800	5,288,952	366,303	7.02	313,405	5.93	(52,898)	-1.10	102.4	102.4	102.4	-0.1	0.0	0.1
18-29	3,225,832	3,468,964	115,512	3.58	266,474	7.68	150,962	4.10	94.0	92.1	99.3	-1.9	5.3	7.1
30-49	4,099,633	4,421,916	257,871	6.29	545,002	12.33	287,131	6.03	86.2	89.0	95.9	2.8	9.8	6.9
50+	2,359,603	2,578,879	(8,969)	-0.38	213,499	8.28	222,468	8.66	71.5	72.1	78.3	0.6	6.8	6.2
BLACK FEMALE														
All ages	16,476,225	16,560,842	660,316	4.01	497,892	3.01	(162,424)	-1.00						
0-17	5,095,218	5,163,952	360,300	7.07	306,185	5.93	(54,115)	-1.14						
18-29	3,501,319	3,494,449	192,242	5.49	101,299	2.90	(90,943)	-2.59						
30-49	4,606,129	4,610,127	147,573	3.20	115,103	2.50	(32,470)	-0.71						
50+	3,273,559	3,292,314	(39,799)	-1.22	(24,695)	-0.75	15,104	0.47						
NONBLACK MALE														
All ages	108,722,274	108,960,853	1,653,007	1.52	2,141,836	1.97	488,829	0.45	95.9	96.5	97.2	0.7	1.3	0.6
0-17	28,433,994	28,185,806	699,213	2.46	410,499	1.46	(288,714)	-1.00	105.5	105.5	105.2	-0.0	-0.3	-0.3
18-29	21,879,384	21,505,183	677,649	3.10	270,786	1.26	(406,863)	-1.84	103.8	104.6	104.9	0.8	1.2	0.4
30-49	32,866,059	33,127,154	426,064	1.30	893,440	2.70	467,376	1.40	99.6	100.3	102.0	0.7	2.4	1.7
50+	25,542,837	26,142,710	(149,919)	-0.59	567,111	2.17	717,030	2.76	79 4	79.9	80 8	0.5	1.4	0.9
NONBLACK FEMALE														
All ages	112,613,453	112,113,380	958,907	0.85	705,805	0 63	(253,102)	-0.22						
0-17	26,950,369	26,786,134	665,133	2.47	471,038	1.76	(194,095)	-0.71						
18-29	20,923,599	20,492,491	493,920	2.36	52,193	0.25	(441,727)	-2.11						
30-49	32,755,528	32,476,327	181,478	0 55	70,778	0.22	(110,700)	-0.34						
50+	31,983,957	32,358,428	(381,624)	-1.19	111,796	0.35	493,420	1.54						

Note: PES estimates are based on the "357-Poststrata" Design. The PES and DA methodology and results are found in Robinson et al (1993a). Col. 7-8· A positive difference means that the demographic estimate is higher than the PES estimate; a negative difference means that the demographic estimates is lower.